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THE DEVELOPMENTAL COURSE AND OUTCOME OF
READING DISABILITY IN A POPULATION FOLLOWED
FROM KINDERGARTEN TO YOUNG ADULTHOOD

Patienne O. Bourgeois

YALE UNIVERSITY

2001

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**The Developmental Course and Outcome of
Reading Disability in a Population Followed from
Kindergarten to Young Adulthood**

A Thesis Submitted to the
Yale University School of Medicine
in Partial Fulfillment of the Requirements for the
Degree of Doctor of Medicine

By
Fabienne C Bourgeois
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Abstract

THE OUTCOME OF READING DISABILITY IN A POPULATION FOLLOWED FROM KINDERGARTEN TO YOUNG ADULTHOOD

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I investigated how reading disability in childhood affects the especially challenging transition to young adulthood. The outcomes of young adults with RD were compared to non-impaired (NI) readers in general self-concept, academic self-concept, education, anxiety/depression, delinquency, and alcohol/nicotine use. RD and NI groups were compared in academic aspirations, type of post-secondary school attended, locus of control, personal perceptions of learning disability, mentoring, and rates of marriage and pregnancy. Furthermore, we analyze whether environmental stressors and protective factors predict outcome in the domains of adulthood. 395 young adults from the Connecticut Longitudinal Study, who have been prospectively followed for 17 years, completed a telephone interview addressing these issues. The RD group was subdivided into criterion-specific groups: Low achievers, (LA), Low Achievers who also met the discrepancy criterion (LARD), and those who met the discrepancy criterion with reading scores above the criterion for low achievement (HiRD). The NI group was further subdivided into a high IQ group (HiIQ), a high reading with average IQ group (HiRead) and the remaining participants were identified as average readers (AVG). The multivariate comparison (NI, n=231; RD, n=73) revealed statistically significant differences ($p < .001$), with the univariate comparisons revealing that the RD group performed worse in academic self-concept, delinquency, and education, but better in general self-concept. Significant differences were also observed in pairwise comparisons of the LA and AVG, and LARD and AVG ($p < .001$) subgroups, with the LA and LARD performing significantly worse. Subjects with high levels of environmental stressors (high risk) did not differ in outcome from those with low risk. The protective factors failed to predict favorable outcome among RD subjects.

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Chapter 1

Introduction

Introduction

The purpose of this project is to investigate how reading disability in childhood affects the transition to adulthood. The availability of a unique cohort, young adults who are participants in the Connecticut Longitudinal Study (CLS) and who have had their reading performance assessed yearly throughout their primary and secondary schooling, allows a prospective assessment of this question. In contrast to retrospective studies in which there is always concern about the reliability of the diagnosis in childhood, the CLS population has been followed longitudinally for 17 years and the young adults have been prospectively diagnosed and monitored from kindergarten entry, allowing the investigation of the relationship between the diagnosis of poor reading in early school years and current performance as young adults.

In this thesis I explore the hypothesis that the adjustment/transition into adult life is an especially difficult period for adults who have histories of reading disability in childhood. Reading disability (RD) has far-reaching consequences, not only in terms of academic pursuits, but also in all of the domains of adulthood.

Dyslexia

Developmental dyslexia (specific reading disability, RD) describes a cluster of symptoms that result in difficulties with specific language skills. It is characterized by

unexpected difficulty in reading in children and adults who otherwise possess the intelligence, motivation and schooling considered necessary for accurate and fluent reading. Reading disability is the most common of the learning disorders, accounting for approximately 80% of all diagnosed cases of learning disabilities (Beitchman & Young, 1997; Lerner, 1989). There is a strong consensus among researchers that the central difficulty in dyslexia reflects a deficit within the language system in the brain. Dyslexic individuals have difficulty transforming the letters on the page (the orthography) to the sound structure of language (the phonology). The difficulty has been attributed to a deficit in phonological awareness. Phonology refers to the science of speech sounds, in which the phoneme is considered the basic unit. A phoneme is the smallest unit of speech, of which there are 44 in the English language. Each word is composed of phonemes, which are unconsciously combined during speech to produce every word in a language. Even rudimentary utterances, such as a baby's babbling are composed of identifiable phonemes. By six months of age, a baby's babbling conforms to some of the phonological rules of his/her native language (Barinaga, 1997; Kuhl, Williams, Lacerda, Stevens, & Lindblom, 1992). Reading, however, is a human innovation that must be taught. When reading, an unimpaired reader is able to break down or decode a word into its phonological components, and thus process the word for comprehension. In dyslexia, however, the ability to break down words into their respective components is deficient, and the person is unable to decipher the word for further, higher-level processing (Shaywitz, 1998).

The prevalence of reading disability has been estimated at anywhere from 5 to close to 18% of school children (Shaywitz, 1998). Dyslexia was previously believed to

characterize the extreme lower peak of a bimodal distribution of reading ability (Rutter & Yule, 1975). Specific reading disability or dyslexia, defined as a discrepancy between a person's reading achievement and Full Scale IQ, was thought to represent a disorder distinct from general poor readers. In contrast, "general reading backwardness" or a "garden variety poor reader" was defined as achievement in reading lower than expected for a person's grade or age, but at a level consistent with Full Scale IQ. The underlying mechanism of the disorder, as well as the prognosis was thought to be different between these two groups (Rutter, 1989). However, Shaywitz et al (1992) demonstrated that reading ability exists along a normal distribution, with dyslexia at the tail end of the continuum (Shaywitz, Escobar, Shaywitz, Fletcher, & Makuch, 1992). Several studies have also examined phonological awareness among both the discrepant readers and the general low achievers, and have found similar deficits between the two groups (Hurford, Johnston et al., 1994; Hurford, Schauf, Bunce, Blaich, & Moore, 1994).

Although dyslexia was commonly believed to occur at higher rates in boys, this most likely reflects a referral bias, and studies have since shown that equal numbers of boys and girls are affected (Shaywitz, Shaywitz, Fletcher, & Escobar, 1990).

Only a fraction of students with reading disabilities are identified correctly and selected for special instruction. During the school years the burden of a reading disability can lead to a range of adverse consequences, including academic: low academic self-concept, academic failure, higher drop-out rates; and personal: increased frustration and anxiety. It was once postulated that dyslexia was a transient problem of childhood, which would eventually disappear as a child reached adulthood. Many studies, however, have shown that reading difficulties persist into adulthood and, can in fact become more

devastating as an individual matures (Gajar, 1992; Gerber et al., 1990; Maughan, 1995; Patton & Polloway, 1992; Spreen, 1988).

Dyslexia in Adulthood

In making the transition from childhood to adulthood, an individual enters a realm filled with new responsibilities and expectations that can be divided into at least five identifiable domains: 1) education and employment 2) community involvement/social adjustment 3) home/family life 4) psychological/emotional health 5) personal responsibility/behavior (Patton & Polloway, 1992). These demands can be formidable for anyone, but introduce even greater challenges to the reading disabled young adult. Tasks that the average person considers second nature can offer a completely different dimension of difficulty to the person with dyslexia. Individuals who previously were able to compensate for their disability may find themselves suddenly struggling as they face new, increasingly complex, and unique circumstances. These adults are not just confronted with their childhood problems in a new context, but may be challenged by a series of new impediments. Each of the domains of adulthood affords its own unique challenges.

Education/Employment

The transition into young adulthood is a time of flux wrought with uncertainty. Young adults are exploring their educational and vocational options and trying to find an adequate fit. It is a period of change with movement from school to work or from one school to another. Siegel et al (1991) linked frequent job changes at this time to ultimate



employment success for youths with learning disabilities (Siegel & Gaylord-Ross, 1991). This period in their lives allows them to work toward their possible ideal niche.

In the realm of education, individuals with learning disorders consistently fare worse than their peers. High school drop-out rates are increased among the learning-disabled population, presumably influenced by repeated incidents of academic frustrations and failures (Murray, Goldstein, Nourse, & Edgar, 2000; White, 1992). Those who do finish high school often end their formal education at this point or decide to enroll in a vocational or technical school, rather than an academic college or university (Maughan, 1995). Many never quite realize their full academic potential. Those who choose to embark upon an academic path often require more time to finish in order to attain the same level of education as their non-impaired peers (Vogel & Adelman, 1992). Similarly, long-term academic aspirations are curtailed in this group, as far fewer consider achieving advanced degrees.

Employment is equally challenging and problematic. In a review of the literature, White (1992) observed that the reading disabled population consistently demonstrated higher rates of unemployment, underemployment, and lower salaries (White, 1992). Anywhere from 37-60% of LD individuals were employed in low-level service jobs, far more than their non-reading impaired counterparts. These individuals often displayed higher rates of dissatisfaction and frustration with their occupation. As a group, they achieved less status than their parents, remaining on the lower rungs of the social ladder. Many remained dependent on parents for financial support or housing, with only ~50% living independently. Gerber et al (1992), however, notes that real vocational success should be observed after this transitional time, when individuals have settled upon a

vocation and have greater stability in their lives and careers (Gerber, Ginsberg, & Reiff, 1992). It is difficult to study employment success at entry-level jobs, as these are not necessarily reflective of ultimate potential and success.

Many reasons have been proposed to explain the difficulties in educational and vocational attainment among the reading disabled population. Several studies have cited a lack of personal empowerment as an impediment in attaining better positions, promotions, or academic success (Gerber, 1999; Gerber et al., 1992; Raskind, Gerber, Goldberg, Higgins, & Herman, 1998). The need for self-advocacy and self-determinism in vocational and academic achievement as an important factor in employment success has been recognized for some time. Minskoff et al (1987) suggested that the common misperceptions about learning disabilities among employers may prevent an individual from receiving the necessary accommodations for the particular learning disability in the workplace (Minskoff, Sautter, Hoffmann, & Hawks, 1987). The employer's attitudes toward visible physical handicaps were far more flexible and accommodating than for the learning disabled. Also, many individuals are reluctant to admit that they have a learning disability because of feelings of shame, guilt, embarrassment, or perceived prejudice (Shessel & Reiff, 1999). They feel the need to hide their disability to avoid the misunderstandings about learning disorders, further preventing any constructive intervention to occur (Tremaine, 2000).

Community involvement/social adjustment

There is some debate in the literature about the social and community interactions of the reading disabled young adult. In a meta-analysis, Kavale et al (1996) contends that

there is greater prevalence of social skill deficits or lack of social competence in the LD population (Kavale & Forness, 1996). He found that 75% of LD individuals can be differentiated from controls on the basis of a social skill deficit. There is no distinct causal relationship, but rather, some evidence that LD and social skill deficits coexist. In his review of the literature, White (1992) finds that the LD adults are less involved in social and leisure activities, and admit to having fewer friends (White, 1992). Shyness, fear of rejection, lack of self-confidence and fear of exposing their limitations were specified as reasons to account for the decreased rates of dating and limited friendships. In contrast, Lewandowski and Arcangelo (1994) compared 40 young adults identified as learning disabled in the New York City public schools with 41 controls on measures of social adjustment, and found no differences between the groups (Lewandowski & Arcangelo, 1994).

Home/Family Life

Marriage and pregnancy have also been studied, although mostly in women with learning disorders. The age at which young women with dyslexia begin childbearing and move into cohabitation is believed to be much younger as compared to their non-disabled peers (Beitchman & Young, 1997; Maughan, 1995). Early parenthood might represent an alternate route of fulfillment for these women, who experienced years of academic difficulties. Rauch-Elnekave (1994) observed that a group of young women who were participating in a program for teenage mothers, consistently identified math as their favorite subject, whereas English and social studies were their least favorite (Rauch-Elnekave, 1994). When she tested these individuals on measures of reading achievement,

the majority performed below their grade level. Motherhood could represent a different, less conventional path of satisfaction for learning disabled individuals. Few studies have examined the rates of marriage among men with learning disabilities, and none have identified the rates of fatherhood among the reading disabled population.

Psychological/Emotional Health

The domain of psychological and emotional adjustment includes a number of categories, including self-concept, anxiety, depression, and locus of control.

Self-concept can be further subdivided into global/general self-concept and academic self-concept. Reading disabled individuals usually fare as well as their peers on measurements of global self-concept throughout development (Bear, Minke, Griffin, & Deemer, 1998). LD individuals consistently perceive themselves in a positive light in terms of self-esteem, general competence and social status. However, on measures of academic self-concept, this population usually scores much lower (Maughan, 1995). Regardless of their level of attainment, the learning disabled regard themselves as less capable in the academic realm as compared to their classmates. Teachers also have lower academic expectations of LD children, classifying them as less capable as compared to their peers (Meltzer, Roditi, Houser, & Perlman, 1998).

A review by Huntington and Bender (1993) indicated that rates of anxiety and sleep disturbances were greater among the LD population (Huntington & Bender, 1993). The prevalence of depression was estimated at 26% in the LD students, compared to 10% of the non-impaired controls. The highest rate of depression was observed during junior high school, after which the levels slowly decline. There is also a concern that the rate of

suicide is increased among the LD population, possibly a sign that they have limited coping strategies. Shessel and Reiff (1999) interviewed 14 adults with Learning disability and found the recurrent theme of the "impostor phenomenon" (Shessel & Reiff, 1999). This phenomenon relates to the anxiety surrounding the persistent feeling of being a fraud or creating a false perception of competence. These individuals expressed a fear of ultimately being exposed and "found out" as not being as capable as they appear.

Attitudes toward success and failure also differ between the LD and NI populations. The exact nature of the differences in locus of control between the LD and NI populations are rather complex and studies have found contradictory results. Some studies have shown that the LD individuals are much more self-critical, attributing both successes and failures to internal factors, while their peers attribute failure to external factors (Huntington & Bender, 1993). Other studies have shown that LD individuals believe that they have less control over events in their lives, attributing successes to external causes such as luck and chance, rather than to internal personal choices (Bosworth & Murray, 1983; Pintrich, Anderman, & Klobucar, 1994). This may lead to an attitude of resignation, helplessness and lack of personal proactive control over events in their lives.

Personal responsibility and Behavior

There has been substantial debate over the relationship between reading disability and delinquency. Concomitant behavioral problems such as oppositional defiant disorder and attention-deficit/hyperactivity disorder complicate the assessment of the relationship. Numerous theories suggest that reading disability may lead to later behavioral problems

and delinquency (Smart, Sanson, & Prior, 1996; Waldie & Spreen, 1993). Some theories attribute reading disability as the cause of behavioral problems and school failure, and vice versa, whereas others suggest that there might be a commonality underlying behavioral disorders and reading disability. Most studies have failed to demonstrate a clear link between the two disorders (Fergusson & Lynskey, 1997). Furthermore, behavioral problems have been shown to be unstable over the years, with a peak in adolescence (Smart et al., 1996). A few studies have investigated the prevalence of RD among prison inmates and have found greater rates of reading disorders than in the general population (Winters, 1997). But, among all RDs, only a very small percentage are incarcerated.

Substance abuse, such as nicotine and alcohol abuse, are somewhat difficult to examine in young adults, as this is the period of greatest usage and experimentation among all individuals, regardless of disability. Generally, though, few studies have examined nicotine and drug use in the reading disabled population. There is no evidence to date that there is any greater use among individuals with a learning disorder, than among their non-impaired peers.

Risk and resilience

Numerous factors have been identified as possible risk factors complicating the outcomes of individuals with learning disabilities and setting them up for an even rockier course. Several elements have been recognized in the literature as placing individuals at greater risk for a poor outcome. These include IQ, SES, initial severity of the learning disability, and age of diagnosis (Beitchman & Young, 1997; Maughan, 1995). The latter

two components- initial severity and age of diagnosis- are presumably related, as a greater severity of a learning disability is more likely to come to an educator's or parent's attention and thus lead to an earlier diagnosis.

Environmental stressors have also been identified as potential risk factors. These include family structure (e.g. single parent household, stepparent), parental substance abuse, poor emotional health of either parent, violence, and adverse life events (e.g. death of a parent or close relative, divorce) (Borowsky & Resnick, 1998; Spekman, Goldberg, & Herman, 1993; Spekman, Herman, & Vogel, 1993; Werner, 1992, 1997). A stable home environment is deemed important for a positive outcome.

Similarly, a number of protective factors that enhance an individual's outcome, have also been characterized. These can be described as both external and internal elements: early easy temperament (which leads to a more positive response from a caregiver), creativity, mentoring, persistence, realistic goal setting, acceptance of the disability, control, coping mechanisms and support systems (Brooks, 1994; Keogh & Weisner, 1993; Spekman, Goldberg et al., 1993; Spekman, Herman et al., 1993; Werner, 1992, 1997).

Defining dyslexia: Reading disability subgroups

When considering individuals with reading disabilities and their outcomes, some attention must be given to the definition and classification of individuals as reading disabled, and the subgroups that exist within these definitions. Most definitions of dyslexia or specific reading disability rely upon an individual's Full Scale IQ for the diagnosis of a reading disability. The standard-score discrepancy model is based on a

significant difference (usually one to two standard deviations) between IQ and reading achievement standard scores; the linear regression discrepancy model estimates reading achievement as predicted by the Full Scale IQ (Buka, Satz, Seidman, & Lipsitt, 1998). When an observed reading standard score is substantially (usually 1 or more standard errors of prediction) lower than that predicted by the person's Full Scale IQ, then the diagnosis of RD is established. Another frequently used definition uses only reading scores to classify individuals with reading disabilities, disregarding IQ. A low achievement definition establishes a cutoff standard score below which a person is determined to be reading disabled. The standard score chosen is typically associated either with a particular percentile rank (e.g. the 25th or 15th), or a number of standard deviations below the mean (e.g. 1 or 1.5). The discrepancy and regression models both tend to overidentify individuals with higher IQ (Shaywitz, Fletcher, Holahan, & Shaywitz, 1992), while the cutoff method often disregards individuals with higher IQs. Three distinct subgroups of reading disability can be identified with these models. The first group, the discrepant only group, consists of those individuals who have a very high IQ, but who are reading disabled by the discrepancy model, although their reading achievement score is still at or above average. The second group, the low-achieving/discrepant group, includes those individuals with an average IQ whose reading score is both discrepant and below the low achievement cutoff. The third group, the low achievers only, comprises those individuals who score below average in both IQ and reading achievement, and would be identified by the cut-off method, but do not meet the discrepancy definition.

These definitions have important implications for how children are identified and receive special education and accommodations. For example, are individuals with a high IQ who meet the discrepancy definition, but whose reading achievement is still at or above what is expected at their grade level, in need of intervention? What are the consequences of having a diagnosis of reading disability in young adulthood? Do children who meet different definitions of RD achieve the same levels of attainment in the domains of young adulthood? In what ways do these subgroups differ from their non-impaired counterparts? Do these individuals ultimately have similar outcomes as their IQ-matched peers? Do they behave more like their peers with similar reading abilities? Although several studies have concluded that IQ is one of the most important predictors of outcome (Beitchman & Young, 1997; Maughan, 1995; Spekman, Goldberg et al., 1993; White, 1992), others suggest a more complex course. Waldron et al (1987) evaluated gifted students with LD between the ages of 8-12 years, and found signs of increased anxiety, dissatisfaction, decreased acceptance by peers, and lower self-concept, especially in the academic realm (Waldron, Saphire, & Rosenblum, 1987).

The debate also continues over whether there is a difference in prognosis between dyslexia, as defined by discrepancy in the first two groups, and the third group- the general low achievers (Rutter & Yule, 1975). Studies have shown that there are more similarities than differences between individuals identified by the discrepancy-based models and the low-reading achievement models in grade school, and that the differences which were found could be accounted for by differences in IQ among the groups (B. A. Shaywitz et al., 1992). No studies, however, have compared outcomes in young adulthood between these groups in a prospective longitudinal survey sample.

Hypotheses

With this as background, the primary hypotheses examined in this thesis are:

- 1) RD adults have higher rates of unemployment and are less satisfied as compared to adults who have not had a history of RD in childhood.
- 2) Fewer RD individuals graduate with a high school diploma and continue their education when compared to non-impaired peers.
- 3) RD adults are less likely to engage in social events and leisure activities.
- 4) Marriage and pregnancy rates are increased among the RD population for both men and women, signifying an alternate route of fulfillment.
- 5) Increased rates of delinquency are found among the reading disabled population.
- 6) RD adults have higher rates of anxiety and depression, regardless of academic achievement.
- 7) RD adults engage in greater rates of nicotine and alcohol use.
- 8) RD adults have no difference in global self-concept, compared to their peers but in academic self-concept rate themselves more negatively.

Furthermore, the following ancillary hypotheses will be explored:

- 1) RD individuals attribute success and failures to external forces of luck and chance, unlike their peers who take responsibility for their own success.
- 2) Marriage and pregnancy rates are higher among the RD population.
- 3) Mentoring is important for positive educational outcomes in the RD population.
- 4) Post-secondary school attendance and aspiration are lower among the RD individuals.

Risk Factors

1) Individuals who were exposed to multiple environmental stressors (i.e. low SES, death in the family, divorce, parental substance abuse, etc.) are not at higher risk to develop a reading disability, but are at higher risk of an adverse outcome, as defined by the six domains of adulthood.

Protective Factors

1) RD Individuals who possess certain protective factors (i.e. adaptability, easy temperament, organizational skills, non-violent or impulsive behavior, and peer acceptance) are more likely to succeed in the domains of education, anxiety/depression, and delinquency, than RD individuals who do not possess these traits.

Chapter 2

Methods

Sample Selection and Group Definitions

Children for this study were recruited from the Connecticut Longitudinal Study (CLS), a cohort of 445 children representative of those children entering public kindergarten in Connecticut in 1983. This cohort, assembled from a two-stage probability-sample survey, has been followed longitudinally since enrollment, with yearly assessments of academic skills and parent/teacher behavior ratings, and evaluation of intelligence every two years. For the current study, 395 participants completed the Yale Young Adult Survey in a one-hour telephone interview conducted between 1998 and 2000. Interviews were completed by a group of trained interviewers.

Two preliminary groups of CLS subjects were identified based on their status in third grade: 1) children who met criteria for reading disability (RD) ($n = 74$) and 2) a comparison group of non-impaired children (NI) ($n = 321$). Reading disability was defined using the Full Scale IQ score from the Wechsler Intelligence Scale for Children-Revised (Wechsler, 1974) and the Reading Cluster Score of the Woodcock-Johnson Psycho-Educational Test Battery (Woodcock & Johnson, 1977). Children were defined as reading disabled if their age-adjusted score on the Woodcock-Johnson Basic Reading composite was either a) 1.5 standard errors below the score predicted by their Full Scale IQ (discrepancy definition); or b) < 90 (below the 25%ile - low achievement definition). Extensive research (B. A. Shaywitz et al., 1992) has shown that both of these definitions

validly identify children as reading disabled, with little evidence for differences in cognitive characteristics, chronicity, or response to intervention between subgroups of children with reading disability formed with these definitions. The group of NI children did not meet the above criteria.

The RD group was subdivided into criterion-specific groups: low achievers, (LA, $n = 44$), low achievers who also met the discrepancy criterion (LARD, $n = 17$), and those who met the discrepancy criterion with reading scores above the criterion for low achievement (HiRD, $n = 12$). The NI group was further subdivided into a high IQ group (HiIQ, $n = 68$; $FSIQ > 116$), a high reading with average IQ group (HiRead, $n = 21$; WJ Reading Cluster > 116 and $FSIQ < 116$), and the remaining participants were identified as average readers (AVG, $n = 232$, $FSIQ < 116$ and W-J Reading Cluster < 116).

The demographic characteristics of these groups in Grade 3 are presented in Table 1.

Comparisons of the RD and NI groups reveal, not surprisingly, that the RD group has lower mean scores on FSIQ, reading, and social class (all $p < .001$). Comparisons among the three NI and three RD subgroups reveal that all subgroups differ from each other on reading ($p < .001$) except for the HiIQ and HiRead groups. Twelve of 15 pairwise comparisons for FSIQ were statistically significant (all $p < .04$). Three non-significant differences were found between the HiRead and AVG, HiRead and LARD, and LA and RD groups. Similarly, significant pairwise differences were found for eight of 15 pairwise comparisons of social class. The largest significant differences occurred between two high social class (HiIQ and HiRead) and two low social class groups (LA and LARD). The HiRead group is excluded from subsequent analyses because they are not directly relevant to the specific hypotheses of this investigation.

Table 1. Demographic characteristics of Non-Impaired and Reading Disabled groups.

Group	<i>n</i>	Gender		WISC-R FSIQ ^a		W-J Reading Cluster ^a		SES	
		Males	Females	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
NI	231	144	156	113.2	13.4	108.6	10.7	2.14	1.2
HiIQ	68	34	34	128.2	7.9	123.2	6.2	1.65	.8
HiRead	21	9	12	109.3	4.8	119.6	4.3	1.75	.8
AVG	232	110	122	109.1	12.0	103.3	6.5	2.32	1.2
RD	74	37	37	98.4	16.3	84.1	7.9	3.28	1.3
HiRD	12	8	5	123.9	6.4	93.4	2.6	2.39	1.2
LARD	17	10	7	99.8	12.7	78.3	7.1	3.29	1.2
LA	44	19	25	90.3	10.9	83.5	4.9	3.55	1.4

^a IQ and reading achievement scores are based on third grade.

Procedures

A letter was sent to all of the participants' homes, informing them about the Yale Young Adult Survey. Individuals were then contacted by trained interviewers to complete the confidential questionnaire by telephone. These interviews took place between 1998 and 2000.

Measures

The Yale Young Adult Survey (YYAS) contains information spanning a variety of domains, including education, community service, social activities, reading/literacy, physical/psychological health, substance abuse, behavior, employment, family life, and financial information.

The Multigrade Inventory for Teachers (MIT) is a survey for teachers, which contains information on activity, social functioning, academics, attention, adaptability, behavior and language. The MIT was completed by the participants' teachers annually

during their school years (Agronin, Holahan, Shaywitz, & Shaywitz, 1992; Holahan et al., 2001).

The Yale Children's Inventory (YCI) is a survey for parents and contains information on perinatal history, the family's medical history, behavior, the child's medical history, development, habits, school, language, parental education and significant life events (Shaywitz, Schnell, Shaywitz, & Towle, 1986; Shaywitz, Shaywitz, Schnell, & Towle, 1988). The YCI was completed by all of the participants' parents or legal guardians at the initiation of the longitudinal study in 1983, as the children were entering kindergarten.

Preliminary Scale Development of Outcome Measures

After an extensive review of the literature, seven measures reflecting successful adaptation to the demands of adult life were selected. These measures include education/employment, emotional health (anxiety/depression), delinquency, community involvement, nicotine/alcohol use, and global and academic self-concept. Questions from the Yale Young Adult Survey (YYAS) were selected for each of the seven measures based upon the content validity (see Appendix A). The constituent items of each scale, except for education, were subjected to item analysis and Chronbach's α reliability coefficients were calculated for these measures (Table 2). Employment was excluded from the primary analysis, but included in the qualitative secondary analyses, because this is a period of transition for the participants and relatively few were employed at the time of the survey.

Table 2. Descriptive statistics and alpha reliability coefficients for the seven preliminary measures of adult adjustment.

Measure	Number of Items	<i>n</i>	<i>M</i>	<i>SD</i>	α
Education	6	395	5.50	1.01	
Anxiety/ Depression	9	395	5.39	3.71	.82
Delinquency	18	395	2.14	3.39	.74
Community involvement	17	395	32.30	7.97	.62
Nicotine/ alcohol use	3	395	4.65	2.76	.62
Global self-concept	9	395	16.56	3.12	.71
Academic self-concept	9	394	17.27	3.85	.66

Final Scale Development

The item analyses and reliability coefficients were used to guide revisions of the seven measures. Items found not to contribute to the reliability of their scale (typically having low discrimination indices) were removed from the nicotine/alcohol use, academic self-concept, and community involvement measures. Furthermore, some items from the nicotine/alcohol use and delinquency measures were re-scaled to achieve more appropriate score distributions. The data for the revised scales are presented in Table 3.

Table 3. Descriptive statistics and alpha reliability coefficients for the seven revised measures of adult adjustment.

Measure	Number of Items	<i>n</i>	Mean	<i>SD</i>	α
Education	6	395	5.50	1.01	
Anxiety/ Depression	9	395	5.39	3.71	.82
Delinquency	18	395	2.14	3.39	.85
Community involvement	10	395	16.70	6.70	.67
Nicotine/ alcohol use	3	395	3.09	1.73	.76
Global self-concept	9	395	16.56	3.12	.71
Academic self-concept	7	394	13.96	3.18	.71

To explore the ancillary hypotheses, we sought to examine measures that were more descriptive and qualitative in nature. These questions pertained to locus of control (internal and external), personal importance of control, types of post-secondary schools attended, academic aspirations, LD status, family, mentoring and unemployment. We once again selected questions having content validity for the individual measures (see Appendix B). For the three measures of locus of control the constituent items were subjected to item analysis, and Chronbach's α reliability coefficients were calculated for these measures (Table 4).

Table 4. Descriptive statistics for Locus of Control scales.

Measure	Number of Items	<i>n</i>	Mean	SD	α
Internal Locus of control	4	374	12.26	1.88	.70
External Locus of control	2	374	5.99	1.10	.60
Importance of control	2	373	6.54	1.56	.73

Data Analysis

Analyses of Primary Hypotheses

Reading-disabled Versus Non-impaired

Data from the seven measures of adult functioning were organized into a one-way between-group (RD vs. NI) multivariate design. Scores for the seven measures were analyzed in a one-way MANOVA with $\alpha = .05$. Post-hoc univariate comparisons were tested at the Bonferroni-corrected $\alpha = .05/7 = .007$.

Subgroup Analyses

Primary Comparisons

Data from the seven measures of adult functioning were organized into five one-way between-group multivariate designs, one each for the five primary contrasts of interest. The primary comparisons are presented in Table 5. Scores for the seven measures were analyzed in a one-way MANOVA with $\alpha = .01$, thus maintaining an overall $\alpha \leq .05$ for the primary comparisons.

Secondary Comparisons

Data from the seven measures of adult functioning were then organized into two one-way between-group multivariate designs, one for each of the two secondary comparisons. The two secondary comparisons are presented in Table 5. Scores for the seven measures were analyzed in two one-way MANOVA with $\alpha = 0.025$, thus maintaining an overall $\alpha = 0.05$ for the secondary comparisons.

Table 5. Planned contrasts among NI and RD subgroups.

Group	<u>n</u>	Versus	Group	<u>n</u>
Primary Comparisons				
HiRD	13		AVG	232
HiRD	13		LA	44
HiRD	13		HiIQ	68
HiRD	13		LARD	17
LARD	17		LA	44
Secondary Comparisons				
LARD	17		AVG	232
LA	44		AVG	232

Exploratory Analyses of Ancillary Hypotheses

Each of the measures pertaining to ancillary hypotheses was analyzed separately for the two-group (RD vs. NI) and the five-subgroup comparisons (HiIQ, AVG, HiRD, LARD, LA). Because these analyses are considered to be exploratory, all statistical tests are univariate with $\alpha = .05$.

Scores for the measures of internal control, external control and importance of control were analyzed individually in one-way ANOVAs. The data for the measures of post-secondary school attendance, academic aspirations, LD status, unemployment and mentoring were analyzed using the Pearson Chi-square test and where appropriate, Fisher's exact test.

For the marriage and pregnancy measure, we first separated both the NI and RD groups, as well as the five subgroups, by gender. The data were then subjected to between-group analyses using the Pearson Chi-square test.

Risk factors

In our next analysis, a group of questions reflecting environmental stressors or risk factors that would identify those individuals who might be at greatest risk for a negative outcome were selected from the Yale Children's Inventory (YCI). We used the information which was completed by the parent or guardian at the inception of the study in 1983 and we selected measures which we felt would place children at highest risk (see Appendix C). The questions pertain to the stability of the family and the environment in which the child was developing: stressful life events (e.g. death in the family, mental illness, parental substance abuse, divorce), and maternal education. Furthermore, the

quality or poverty existing in a school district was identified indirectly by the percentage of students participating in free lunch programs. Each risk factor was attributed one point. The risk factors were tallied, and those individuals with three or more risk factors (23.4% of total population) were designated high risk, and the remaining were designated low risk.

Data from the seven measures of adult functioning were organized into one two-way between groups (NI vs. RD and low risk vs. high risk) multivariate design. Scores for the six measures were analyzed in a one-way MANOVA.

Protective Factors

In our next analysis we sought to investigate whether there were any inherent protective factors that might predict a better outcome among the reading disabled group. We wished to predict outcome in three of the domains of adulthood: education, anxiety/depression and delinquency. We also wanted to investigate whether any differences existed on these measures between the RD and NI groups. Our protective factors included measures of coping mechanisms (i.e. adaptability and organizational skills), behavior, including questions about impulse control, violence and tantrums, and personality (temperament and acceptance/likeability.) We chose questions from the MIT completed in third grade, and the YCI that best reflected these measures (see Appendix D). For all six measures, the constituent items were subjected to item analysis, and Chronbach's α reliability coefficients were calculated for these measures (see Table 6)

A canonical correlation analysis was performed using the protective factors as one set of variables and the three outcomes as the second set of variables with the RD ($n =$

74) subjects. This analysis determined whether any combination of the protective factors is associated with outcome. Finally, the protective factor variables were organized into a one-way between groups (RD versus NI) multivariate design. Scores for the six protective factors variables were analyzed in a one-way MANOVA.

Table 6. Descriptive Statistics for Protective Factors

Measure	Number of Items	n	Mean	SD	α
Adaptability-Teacher (MIT)	4	392	5.513	3.500	.81
Adaptability- Parent (YCI)	3	395	2.765	1.953	.73
Organizational Skills (YCI)	2	395	2.942	1.591	.53
Behavior (YCI)	9	395	8.504	5.486	.87
Acceptance/Likeability	2	395	1.205	1.239	.58
Temperament	7	395	5.215	3.828	.67

Chapter 3

Results

Primary Analysis

Two-Group Comparison

Results for the two-group multivariate comparison (NI, $n=321$; RD, $n=73$) are presented in Table 7. The main effect for group was statistically significant with the RD group achieving significantly lower mean overall outcome than did their NI peers. Furthermore, the univariate comparisons indicated that the RD group achieved significantly lower mean outcomes ($p < .01$) in education, academic self-concept, and delinquency. Anxiety/depression ($p < .014$) and social involvement ($p < .012$) approached, but did not reach statistical significance. Nicotine and alcohol use also revealed a trend, with more use among the non-disabled group, but also did not reach significance ($p < .017$). For general self-concept, the RD group viewed themselves more positively than did the NI group. The pattern of mean differences can be seen in Figure 1. Means and standard errors in Figure 1 and all subsequent figures have been standardized (mean = 0 and SD = 1) and, where necessary, reflected, so that higher positive scores indicate better outcome.

Planned Subgroup Comparisons

Results for the overall comparison of the five groups and the five planned pairwise comparisons are also presented in Table 7. With five planned comparisons, the $\alpha = .01$ was used to maintain and overall $\alpha = .05$.

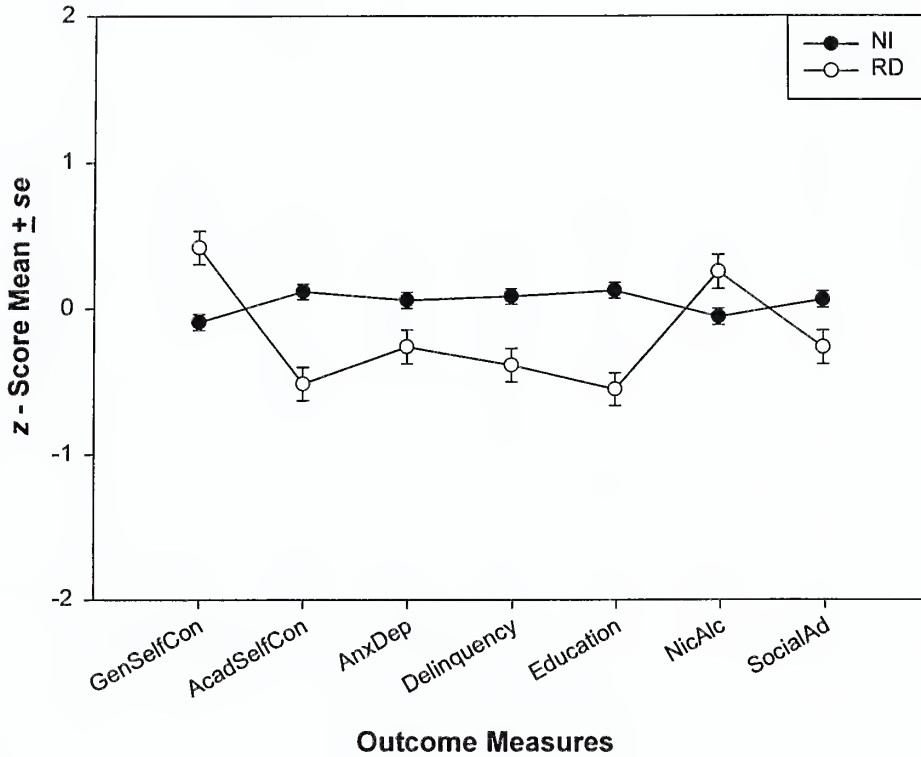
Table 7. Multivariate and univariate analyses of variance summaries of two- and five-group comparisons.

Two-Group Analysis					
Contrast	Wilk's λ	<i>df</i>	<i>F</i>	<i>p</i>	
NI-RD	0.839	7,386	10.54	<.001	
Univariate Comparisons					
Measure		<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
General Self Concept		1, 392	150.73	16.07	< .001
Academic Self Concept		1, 392	238.99	25.09	< .001
Anxiety/Depression		1, 392	82.62	6.08	.014
Delinquency		1, 392	150.55	13.48	< .001
Education		1, 392	27.83	28.97	< .001
Nicotine/ Alcohol		1, 392	16.86	5.71	.017
Social		1, 392	282.01	6.34	.012
Five-group Analyses					
Contrast	Wilk's λ	<i>df</i>	<i>F</i>	<i>p</i>	
HiRD-LA	.629	7, 48	4.05	.001	
Univariate Comparisons					
Measure		<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
General Self Concept		1, 54	29.63	4.22	.045
Academic Self Concept		1, 54	38.58	3.34	.073
Anxiety/Depression		1, 54	81.46	4.60	.036
Delinquency		1, 54	21.00	1.32	.257
Education		1, 54	7.54	4.97	.030
Nicotine/ Alcohol		1, 54	.26	.08	.782
Social		1, 54	440.26	11.45	.001
Contrast	Wilk's λ	<i>df</i>	<i>F</i>	<i>p</i>	
HiRD-AVG	.972	7, 236	.98	.447	
HiRD- HiIQ	.907	7, 72	1.05	.405	
LARD-LA	.888	7, 53	.96	.473	
LARD-HiRD	.496	7, 21	3.05	.022	

The distribution of the observed means for the five groups is presented in Figure

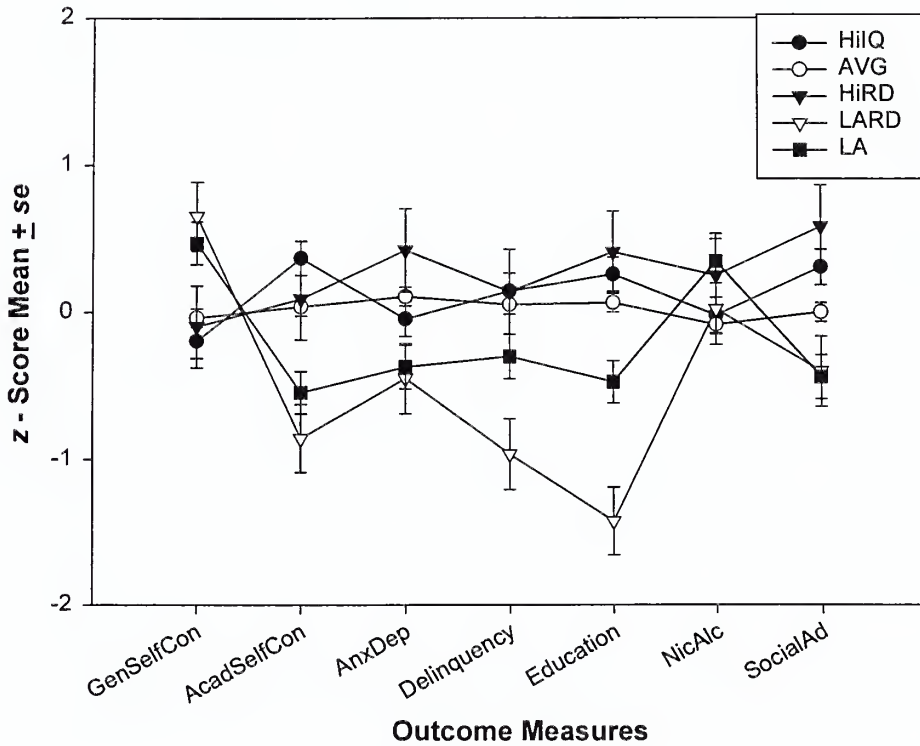
2. For the five planned pairwise comparisons, only the HiRD versus LA contrast was

Figure 1. Statistically significant multivariate pairwise comparison of NI and RD groups on seven outcome measures



statistically significant. No significant differences were obtained for the remaining four planned contrasts for the subgroups: HiRD versus AVG, HiRD versus HiIQ, and LARD versus LA, and LARD versus HiRD, although the observed $p < .022$ obtained for the last contrast suggested a trend.

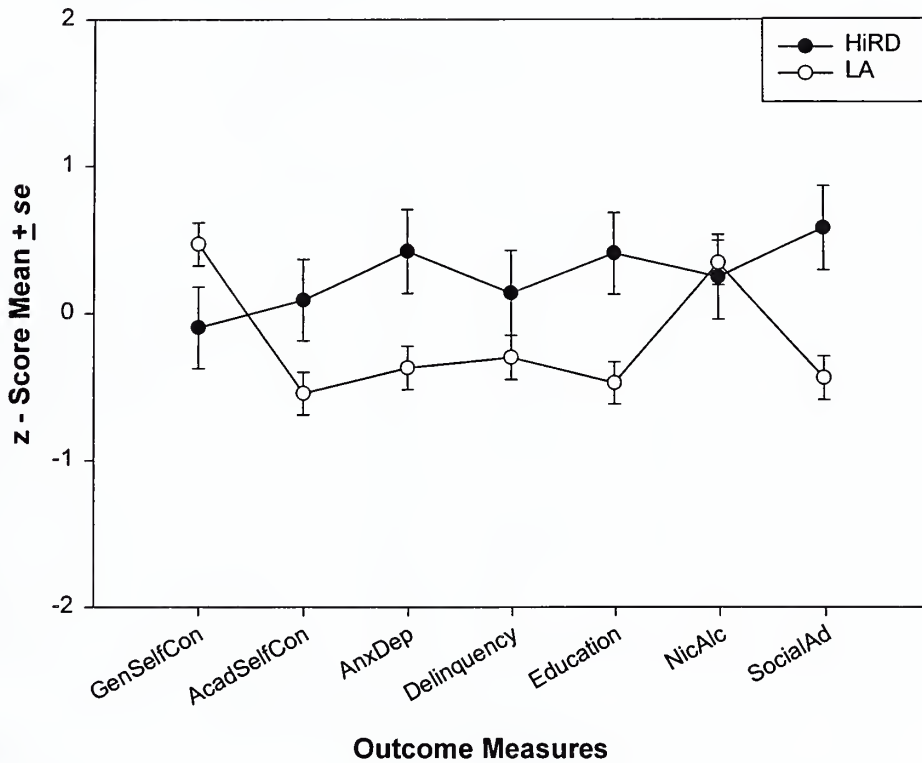
Figure 2. Patterns of observed mean differences for five groups on seven outcome measures



The pattern of mean differences for the statistically significant planned comparison between HiRD versus LA groups is presented in Figure 3.

As can be seen in the figure the largest observed mean difference occurs in social adjustment where the HIRD group rated themselves as significantly more involved in social activities than their counterparts.

Figure 3. Statistically significant pairwise comparison of HiRD and LA subgroups for seven measures of outcome



Secondary Analysis

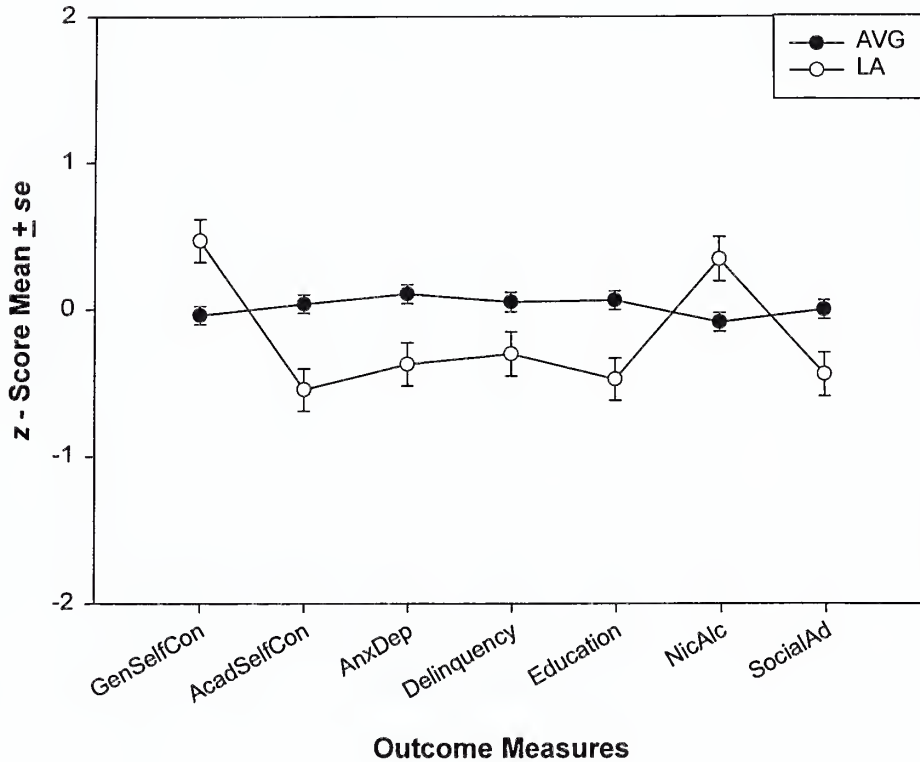
Results of the two secondary analyses, in which the AVG group was first compared to the LA group and then compared to the LARD group are presented in Table 8. Not surprisingly, in both analyses the LA and LARD groups fared far worse than did their non-impaired peers. The LA group reported significantly worse outcomes in academic self-concept, anxiety, and education (Figure 4). Furthermore, there were observed, but not statistically significant differences for general self-concept, delinquency, nicotine and alcohol use, and social involvement, with the LA group

reporting poorer outcome in delinquency, but better outcome in terms of general self-concept and less use of nicotine and alcohol.

Table 8. Multivariate and univariate analyses of variance summaries for the secondary subgroup comparisons.

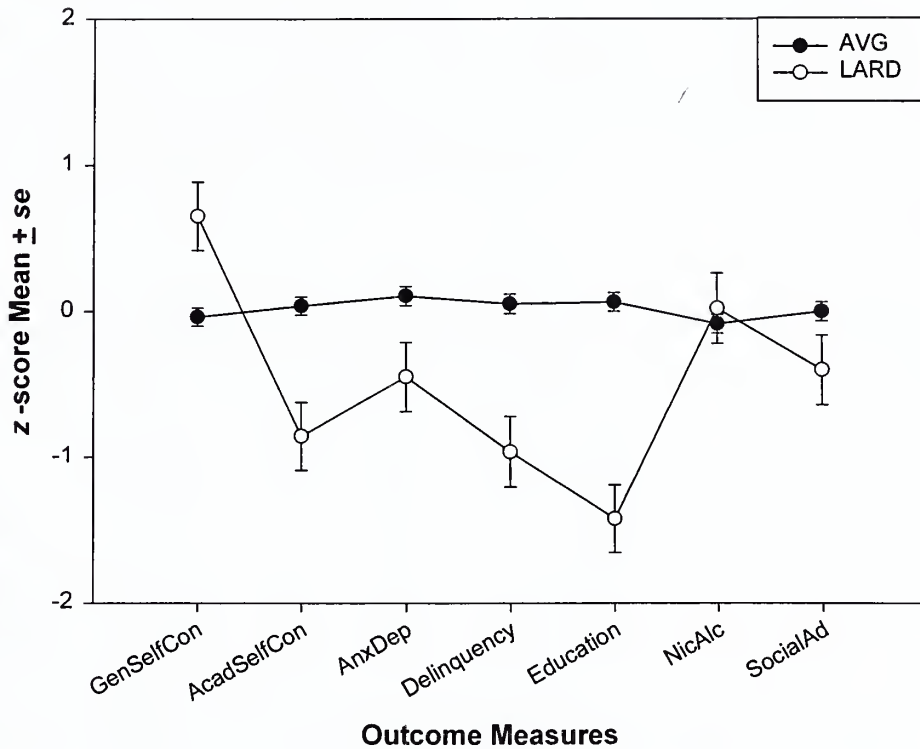
Secondary Analyses					
Contrast	Wilk's λ	df	F	p	
LA - AVG	.852	7, 268	6.68	< .001	
Univariate Comparisons					
Measure		df	MS	F	p
General Self Concept		1, 274	92.69	10.13	.002
Academic Self Concept		1, 274	127.22	12.51	< .001
Anxiety/Depression		1, 274	116.80	8.55	.004
Delinquency		1, 274	53.07	4.91	.028
Education		1, 274	11.04	11.20	.001
Nicotine/ Alcohol		1, 274	20.33	6.72	.010
Social		1, 274	320.55	6.96	.009
Contrast	Wilk's λ	df	F	p	
LARD- AVG	.817	7,241	7.73	< .001	
Univariate Comparisons					
Measure		df	MS	F	p
General Self Concept		1, 247	73.12	7.79	.006
Academic Self Concept		1, 247	128.35	13.40	< .001
Anxiety/Depression		1, 247	67.42	5.31	.022
Delinquency		1, 247	188.59	14.93	< .001
Education		1, 247	36.12	36.29	< .001
Nicotine/ Alcohol		1, 247	.53	.18	.673
Social		1, 247	114.95	2.52	.113

Figure 4. Statistically significant pairwise contrast of AVG and LA subgroups in seven outcome measures



The comparison of the LARD vs. AVG group revealed significant differences with the LARD group scoring worse on measures of academic self-concept, delinquency and education, but better on general self-concept. The anxiety/depression measure suggested a trend, but was not statistically significant (Figure 5).

Figure 5. Statistically significant pairwise contrast of the AVG and LARD subgroups on seven outcome measures



Exploratory Analyses of Ancillary Hypotheses

Post-secondary School

The type of post-secondary school students had most recently attended is presented in Table 9. Statistically significant differences were detected in both the two-group and five-group comparisons. For the two-group comparison, 44.6% of the RD group and 22.7% of the NI group had no education past high school. Conversely, only 33.8% of the RD group had most recently been enrolled in a 4-year academic college or

university, as compared to 61.3% of their NI colleagues (Figure 6). The subgroup analysis also revealed significant differences in post-secondary school attendance, with the LA and especially the LARD sub-groups having the lowest enrollments in 4-year academic programs (27.2% and 5.9% respectively). Only one of the 17 in the LARD group was enrolled in a 4-year college or university. Almost the entire HiRD group, however, was attending a 4-year academic program.

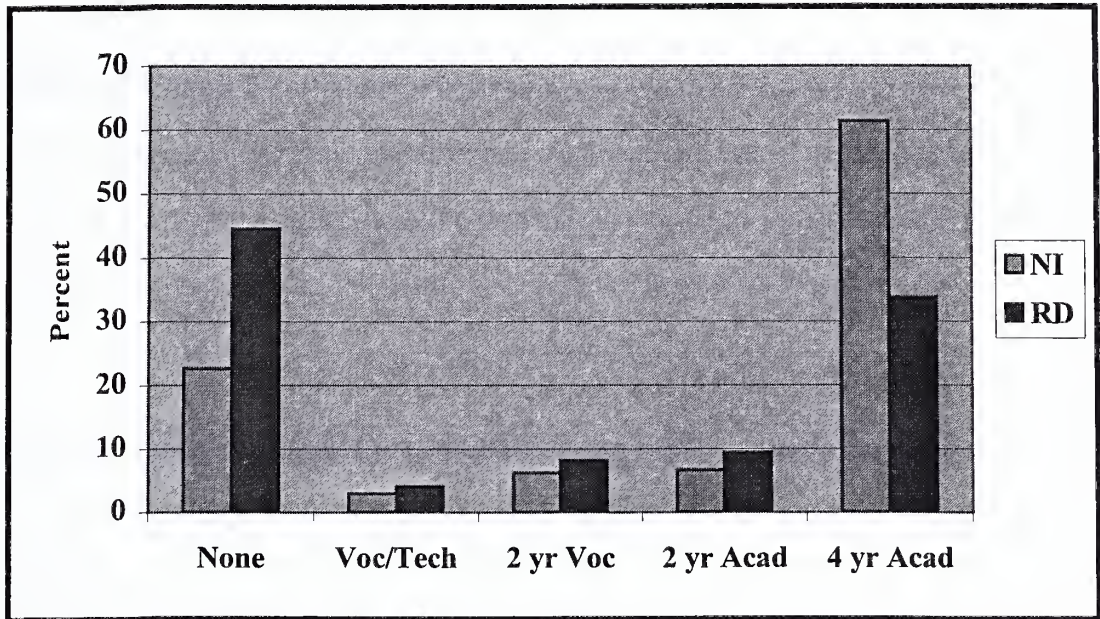
Table 9. Level of educational attainment in two-group and five-group comparisons.

	NI		RD		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
None	68	22.7	33	44.6	101	27.0
Voc/Tech	9	3.0	3	4.1	12	3.2
2 yr Voc	19	6.3	6	8.2	25	6.7
2 yr Acad	20	6.7	7	9.5	27	7.2
4 yr Acad	184	61.3	25	33.8	209	55.9
Total	300		74		374	

	AVG		HiIQ		LA		LARD		HiRD		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
None	59	25.4	9	13.2	19	43.2	14	82.4	0	0.0	101	27.0
Voc/Tech	8	3.4	1	1.5	3	6.8	0	0.0	0	0.0	12	3.2
2 yr Voc	18	7.6	1	1.5	6	13.6	0	0.0	0	0.0	25	6.7
2 yr Acad	18	7.6	2	2.9	4	9.1	2	11.8	1	7.7	27	7.2
4 yr Acad	129	55.6	55	80.9	12	27.3	1	5.9	12	92.3	209	55.9
Total	232		68		44		17		13		374	

Contrast	χ^2	df	p
Two-group	19.76	4	.001
Five-group	71.10	16	< .001

Figure 6. Post-secondary school attendance among RD and NI groups



Academic aspirations

The results from the educational aspirations presented in Table 10 revealed a similar pattern of differences among the groups' academic aspirations with three times as many RD individuals satisfied with their current level of education compared to their NI peers (13.7% vs. 4.3%). Far fewer individuals from the RD group than the NI group were planning on receiving a master's or post-master's degree. The subgroup analysis also revealed some interesting and statistically significant differences. The LARD group once again fared the worst. Only 1 of 13 (7.7%) in the HiRD group was planning on receiving a doctoral degree, compared to the 27.9% of the HiIQ group.

Unemployment

Unemployment was defined as being neither currently enrolled in school as a student nor employed (either full-time or part-time.) The RD group experienced greater rates of unemployment than the NI group. Although the rate of unemployment was relatively low among the NI group (5.7%), the RD group more than tripled that rate (17.8%).

Table 10. Level of educational aspirations in two- and five-group comparisons.

Degree	<i>NI</i>		<i>RD</i>		<i>Total</i>	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
None	13	4.3	10	13.7	23	6.2
Trade	16	5.4	12	16.4	28	7.5
< 2yrs	2	0.7	0	0.0	2	0.5
2+ yrs	24	8.0	5	6.8	29	7.8
Bachelor's	80	26.8	20	27.4	100	26.9
Master's	117	39.1	21	28.8	138	37.1
Doctoral	47	15.7	5	6.8	52	14.0
Total	299		73		372	

Degree	AVG		HiIQ		LA		LARD		HiRD		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
None	2	5.2	1	1.5	4	9.3	6	35.3	0	0.0	23	6.2
Trade	15	6.5	1	1.5	6	14.0	6	35.3	0	0.0	28	7.5
< 2yrs	2	0.9	0	0.0	0	0.0	0	0.0	0	0.0	2	0.5
2+ yrs	21	9.1	3	4.4	5	11.6	0	0.0	0	0.0	29	7.8
Bachelor's	63	27.3	17	25.0	14	32.6	2	11.8	4	30.8	100	26.9
Master's	90	39.0	27	39.7	10	23.3	3	17.6	8	61.5	138	37.1
Doctoral	28	12.1	19	27.9	4	9.3	0	0.0	1	7.7	52	14.0
Total	231		68		43		17		13		372	

Contrast	χ^2	df	p
Two-group	23.483	6	.001
Five-group	79.844	24	< .001

Locus of control

The analysis of locus of control was separated into three variables: internal locus of control, external locus of control and subjective importance of control. The RD vs. NI groups differed significantly in terms of internal locus of control ($p < .001$), as the RD group did not believe that they had enough control over their life and plans. The subgroup analysis again revealed significant differences among the groups ($p < .001$), with the greatest distinction accounted for by the LA and LARD groups. However, when asked about the importance of control, no statistically significant difference was found, either in the two-group or RD subgroup analysis.

The RD vs. NI group was significantly different in the area of external locus of control ($p < .003$), with the RD group attributing success more often to chance and good fortune. The RD subgroup analysis also revealed a significant difference among the groups ($p < .006$.) The LA group differed from the AVG and HiIQ groups and the LARD group differed significantly from the HiIQ group, ascribing most of their achievements to luck in comparison to the rest of their peers.

Table 11. Locus of control in two- and five-group comparisons

Variable		<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Internal Locus of Control					
	Two-Group	1, 372	65.58	19.54	< .001
	Five Group	4, 372	24.52	7.44	< .001
External Locus of Control					
	Two-Group	1, 372	10.87	9.15	.003
	Five Group	4, 369	4.37	3.70	.006
Importance of Control					
	Two-Group	1, 371	2.16	.89	.347
	Five Group	4, 368	3.50	1.44	.221

Knowledge of LD status

When asked whether they had ever been diagnosed with a learning disability, only 45.9% of the RD group, acknowledged ever having been diagnosed or told that they have a learning disorder. In contrast, 11.7% of the NI group had been told at one point or another that they were learning disabled (Table 11). Of the individuals who had been apprised of having a learning disorder, 20.6% of the individuals feared that others might find out about their disability.

When individuals who had not been diagnosed were asked whether they thought that they had a learning disability, only 15% of the RD group thought that they had a disorder, whereas 6% of the NI group believed that they had a learning disability (Table 12).

The RD subgroup analysis showed that 70.6% of the LARD group had been told about their LD status, while only about 38% of the LA and HiRD had been identified or told. Most of the individuals who feared that others might find out about the disability came from the LA and LARD group.

Of the individuals who had never been told that they have a learning disorder, none of the HiRD group considered himself/herself to be learning disabled, while 22.2% and 20.0% in the LA and LARD groups, respectively, suspected that they might have a learning disorder (Figure 7).

Table 12. Knowledge of LD status in two-group and five-group comparisons

LD status	NI		RD		Total	
	n	%	n	%	n	%
No	265	88.3	40	54.1	305	81.6
Yes	35	11.7	34	45.9	69	18.4
Total	300		74		374	

	AVG		HiIQ		LA		LARD		HiRD		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
No	199	85.8	66	97.1	27	61.4	5	29.4	8	61.5	305	81.6
Yes	33	14.2	2	2.9	17	38.6	12	70.6	5	38.5	69	18.4
Total	232		68		44		17		13		374	

Contrast	χ^2	df	p
Two-group	46.36	1	< .001
Five-group	59.72	4	< .001

Figure 7.

Percent of RD and NI individuals diagnosed with a learning disability (LD);
 Percent of individuals diagnosed who fear that others will find out about their LD;
 Percent of individuals who were not diagnosed, but who suspect they might have a LD

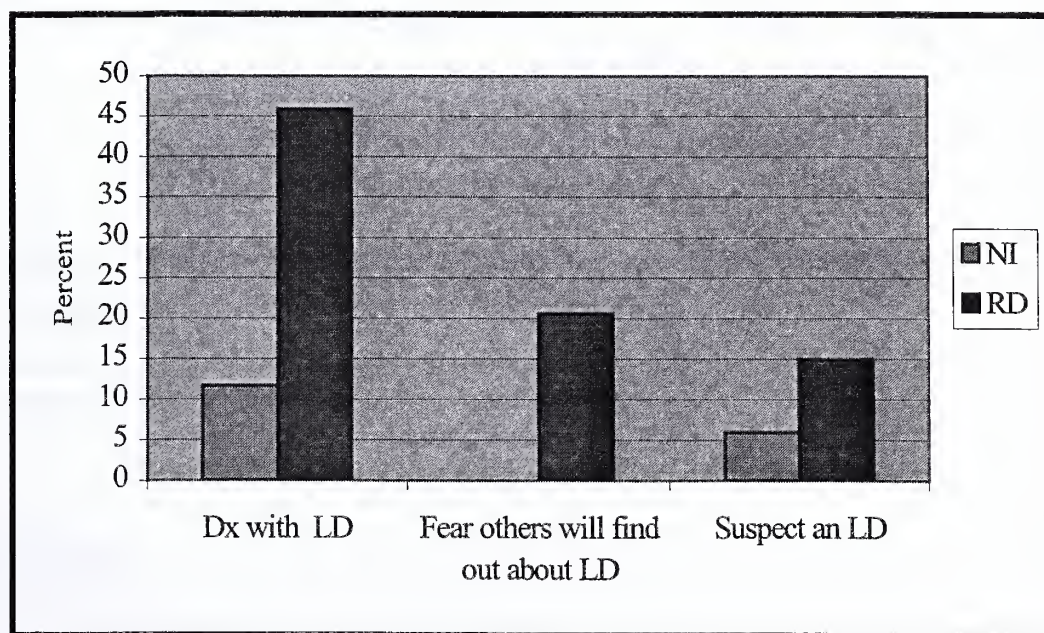


Table 13. Fear of others finding out and perception of LD in two- and five-group comparisons

Fear of LD	NI		RD		Total	
	n	%	n	%	n	%
No	35	100	27	79.4	62	89.8
Yes	0	0	7	20.6	7	10.2
Total	35		34		69	

	AVG		HiIQ		LA		LARD		HiRD		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
No	33	100	2	100	13	76.5	9	75.0	5	100	62	89.8
Yes	0	0	0	0	4	23.5	3	25.0	0	0	7	10.2
Total	33		2		17		12		5		69	

Contrast	χ^2	df	p
Two-group	8.020	1	.005
Five-group	10.762	4	.029

Perception	NI		RD		Total	
	n	%	n	%	n	%
No	249	94.0	34	85.0	283	92.8
Yes	16	6.0	6	15.0	22	7.2
Total	265		40		305	

	AVG		HiIQ		LA		LARD		HiRD		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
No	184	92.5	65	98.5	22	77.8	4	80.0	8	100	283	92.8
Yes	15	7.5	1	1.5	5	22.2	1	20.0	0	0	22	7.2
Total	199		66		27		5		8		305	

Contrast	χ^2	df	p
Two-group	4.171	1	.041
Five-group	10.233	4	.037

Mentoring

When asked about mentors or adults with whom they could talk about their problems, no difference could be found in either the two-group or sub-group analysis

(Table 14). Regardless of achievement, the majority of individuals could identify a confidant or mentor, whether a parent or other adult. The subgroup analysis revealed similar results. A correlation analysis with educational achievement and academic aspiration revealed no relationship with mentoring.

Table 14. Mentoring in two- and five-group comparisons

Parent	NI		RD		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
No	25	8.33	12	16.2	37	9.9
Yes, sometimes	75	25.0	20	27.0	95	25.4
Yes, always	200	66.7	42	56.8	242	64.7
Total	300		74		374	
Contrast	χ^2		<i>df</i>	<i>p</i>		
NI - RD	4.725		2	.094		
Mentor	NI		RD		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
No	80	26.7	17	23.0	97	25.9
Yes	220	73.3	57	77.0	277	74.1
Total	300		74		374	
Contrast	χ^2		<i>df</i>	<i>p</i>		
NI - RD	.422		1	.516		

Marriage and Pregnancy

Significantly more young adults in the reading disabled population were pregnant or had had a child at the time of the survey as compared to their non-impaired peers. This finding held for both the men and the women in each group. 24.3% of the RD men had fathered a child or admitted to someone being pregnant with their child, while only 6.2% of the NI men were either fathers or future fathers (Table 15). Similarly, 29.7% of the RD women were pregnant or had given birth to a child at the time of the survey, as

compared to 12.8% of the NI women (Table 16; Figure 9). The rates of marriage were more similar between the two groups of women, with 16.2% of the RD group and 13.5% of the NI group of women married at the time of the survey. A higher rate of marriage was observed among the RD men (18.9%) as compared to the NI men (7.6%) (Figure 8). The number of women who were both married and either mothers or currently pregnant were also similar in both groups. However, more men in the RD groups were fathers or soon to be fathers and also married as compared to the NI group (13.5% vs 2.8%).

A comparison of the RD subgroups also revealed that the highest rates of pregnancy and marriage occurred among the LA and LARD groups for both males and females.

Figure 8. Marriage rates among RD and NI groups, separated by gender

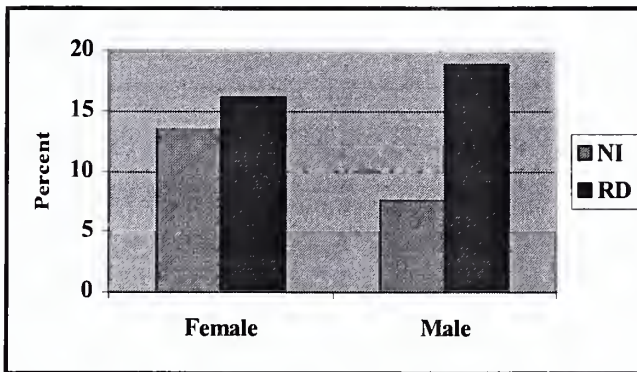


Figure 9. Parenting rates among RD and NI groups, separated by gender

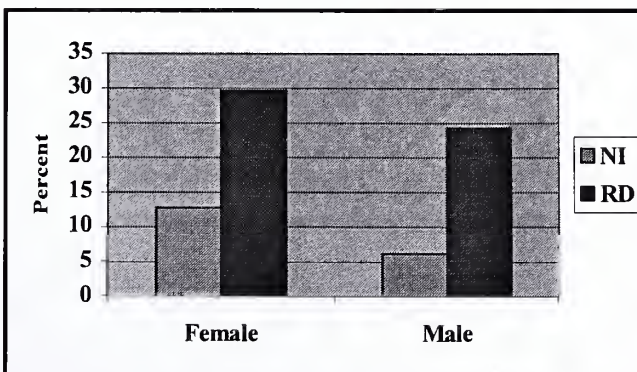


Table 15. Marriage and Pregnancy among men in two- and five-group comparisons

Male												
Marriage	NI		RD		Total							
	n	%	n	%	n	%						
No	133	92.4	30	81.1	163	90.1						
Yes	11	7.6	7	18.9	18	9.9						
Total	144		37		181							
	AVG		HiIQ		LA		LARD		HiRD		Total	
	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>
No	99	90.0	34	100	15	79.0	7	70.0	8	100	163	90.1
Yes	11	10.0	0	0	4	21.0	3	30.0	0	0	18	9.9
Total	110		34		19		10		8		181	
Parent	NI		RD		Total							
	n	%	n	%	n	%						
No	135	93.8	28	75.7	163	90.1						
Yes	9	6.2	9	24.3	18	9.9						
Total	144		37		181							
	AVG		HiIQ		LA		LARD		HiRD		Total	
	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>
No	102	92.7	33	97.1	14	73.7	7	70.0	7	87.5	163	90.1
Yes	8	7.3	1	2.9	5	26.3	3	30.0	1	12.5	18	9.9
Total	110		34		19		10		8		181	

Table 16. Marriage and Pregnancy among women in two- and five-group comparisons

Female												
Marriage	NI		RD		Total							
	n	%	n	%	n	%						
No	135	86.5	31	83.8	166	86.0						
Yes	21	13.5	6	16.2	27	14.0						
Total	156		37		193							
	AVG		HiIQ		LA		LARD		HiRD		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
No	103	84.4	32	94.1	20	80.0	6	85.7	5	100	166	86.0
Yes	19	15.6	2	5.9	5	20.0	1	14.3	0	0	27	14.0
Total	122		34		25		7		5		193	
Parent	NI		RD		Total							
	n	%	n	%	n	%						
No	136	87.2	26	70.3	162	83.9						
Yes	20	12.8	11	29.7	31	16.1						
Total	156		37		193							
	AVG		HiIQ		LA		LARD		HiRD		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
No	103	84.4	33	97.1	17	68.0	5	71.4	4	80.0	162	83.9
Yes	19	15.6	1	2.9	8	32.0	2	28.6	1	20.0	31	16.1
Total	122		34		25		7		5		193	

Risk Factors

More RD individuals were classified as being high risk in comparison to the NI group (Table 17). When the high risk population was compared to its low risk counterparts, the environmental stressors we chose did not predict outcome in six of the seven domains. The only domain which was found to be significantly different was social engagement ($p = .002$), with the high risk group showing far less community involvement than their low risk counterparts (Table 18).

Table 17. RD outcome by risk level

Risk	NI		RD		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Low	255	80.2	45	60.8	300	76.5
High	63	19.8	29	39.2	92	23.5
Total	318		74		392	
Contrast	χ^2		<i>df</i>	<i>p</i>		
NI - RD	12.550		1	<.001		

Table 18. Two-Way MANOVA Summary for RD group and Risk group analysis.

Two-Group				
Source	Wilks' λ	<i>df</i>	<i>F</i>	<i>p</i>
RDGROUP	.871	7, 361	7.65	< .001
RISK GROUP	.965	7, 361	1.88	.071
RD x RISK	.983	7, 361	.91	.50

Protective Factors

The canonical correlation analysis estimated the relationship between the protective factors and outcome in the domains of education, anxiety/depression, and delinquency among the 74 RD subjects (see Table 19). The observed canonical correlation ($R_c = .374$) was not statistically significant, and accounted for no more than 14 percent of the variance between the set of protective factors and outcome. The canonical variate associated with that correlation was also not statistically significant ($\chi^2 [18] = 14.64, p = .686$). Thus, there was no relationship between the protective factors and outcome in the domains of education, anxiety/depression, and delinquency among the 74 RD subjects (see Table 19). Results of the MANOVA comparison of NI and RD

in Table 19 revealed a significant multivariate main effect for group favoring the NI group. Furthermore, the pattern of observed means favored the NI group on all measures. Univariate comparisons revealed significant differences among the teacher's perception of adaptability, and parent's perception of organization, and the child's acceptance/likeability. Non-significant trends were observed for the parent's perception of their child's adaptability and behavior. No significant difference was found for temperament (Table 19).

Table 19. Analyses of Protective Factors

Canonical Correlation Analysis					
R_c	Rao F	df	p		
.374	.810	18,184	.687		
RD-NI Analyses					
Contrast	Wilk's λ	df	F	p	
NI-RD	0.908	6,385	6.468	<.001	
Univariate Comparisons					
Measure		df	MS	F	p
Adaptability-Teacher		1,390	180.34	15.22	<.001
Adaptability- Parent		1,390	19.61	5.18	.023
Organizational Skills		1,390	30.40	12.31	.001
Behavior		1,390	142.91	4.75	.030
Acceptance/Likeability		1,390	17.15	11.42	.001
Temperament		1,390	0.29	0.02	.891

Chapter 4

Discussion and Conclusions

These findings from the Connecticut Longitudinal Study, based on the prospective study of a representative sample survey followed for seventeen years, throughout the entire course of their public schooling, indicate that the reading disabled population faces a difficult transition into young adulthood, especially in the domains of educational achievement/aspirations, employment, academic self-concept, and delinquency. In particular, compared to non-impaired readers, the low achieving (LA) and the low achieving/discrepancy (LARD) subgroups of disabled readers appear to exhibit the greatest struggles during this time of change.

Consonant with the results of previous studies, overall reading disabled (RD) young adults fared far worse in terms of completing high school and in their longterm educational and academic aspirations (Maughan, 1995; Murray et al., 2000; Vogel & Adelman, 1992; White, 1992). For many, the repeated failures or difficulties, especially when comparing themselves to their peers, is associated with a demoralization in the academic realm. These young men and women's perception of their own academic competence is far below that of their peers, but is specific to the scholastic area and does not extend to other areas of self-assurance. The difference seen in academic self-concept does not represent part of an overall inferior view of self-worth, as the overall reading-disabled group (RD) rated themselves higher than their non-impaired peers in the realm of global self-concept. It may be speculated that the impact of feeling that they have to

work harder, and the repeated experience of embarrassment and frustrations throughout the school-age years discourages these individuals from attending more rigorous and academic post-secondary schools, or even aspiring to do so. The low achieving (LA) and low achieving /discrepancy (LARD) subgroups are particularly affected, favoring trade/vocational programs, or no further schooling at all over academic two-year or four-year programs. Very few expect to go on to pursue post-secondary school degrees. The high IQ discrepancy only group also revealed a weakness in this realm. Although this group attained levels of educational achievement similar to their high IQ non-reading impaired counterparts, far fewer of the high IQ discrepancy individuals aspired to complete doctoral programs than their high IQ non-discrepancy peers. This may represent an acknowledgement of the greater difficulty in reading they experience relative to their peers or the cumulative result of years of frustration and struggle, often with very little results or gain. Our data indicate that the high IQ discrepancy group is not aspiring to their full potential. Perhaps these individuals have spent their school-age years internalizing and compensating for their deficit, whether they are aware of their disability or not, and in the process many have created an internalized ceiling for their projected potential. While IQ is a positive prognostic indicator in ultimate outcome, the differences in academic aspiration do point toward the need for intervention and support even among these individuals, throughout the school-age years.

In unemployment, where we defined individuals as unemployed if they were neither working nor attending school, the reading disabled population fared much worse than the non-impaired group. Because this is a time of transition, we did not analyze the quality of the entry level jobs, as there is bound to be much movement over the next few

years, and these jobs do not necessarily reflect future status or achievement (Gerber et al., 1992). Instead we simply focused on whether an individual was working (part-time or full-time), or enrolled in further education- a reflection of goal orientation and early success. Three times as many overall reading disabled individuals were unemployed when compared to the non-impaired group, supporting previous research that learning disabilities predispose individuals to failure in the realm of education and employment (White, 1992). It must be emphasized that this is a time of change and fluctuation. All of the individuals are entering into the adult world and trying to find their respective places. They are expected to explore their vocational and educational options to find the environment in which they are most comfortable. The process of "niche-picking" should ultimately lead the individuals to more satisfying life choices. The reading disabled population might ultimately find jobs that capitalize on their strengths and minimize their weakness-i.e. find jobs with less reading intensive tasks or jobs in which they can compensate for their disability. However, until that time, these individuals are struggling in their search. Even at this early stage, a considerable number of overall reading disabled young adults are not actively involved in pursuing a means toward financial independence, whether that is reflected in further education to improve future employment options, or current employment.

This lack of active participation in finding a job or continuing one's education, as well as the hesitancy toward achieving higher degrees, may be partially explained by the different attitudes toward locus of control. Although the NI group takes personal responsibility for their successes and for the way in which their lives are progressing, as is reflected in their higher scores in the internal locus of control measures, the RD

population perceives the cause for the events in their lives quite differently. The RD individuals attribute the events of their lives to some sort of external factor, be it fate or chance. This holds true for both successes and failures. They perceive that there is an external force either helping them along or preventing them from achieving their goals. This leads to a great deal of uncertainty, as they have no control over this external force. They may be lucky one day, and unlucky the next. Both groups, however, place equal importance on control, which must make the perceived lack of control that much harder for the reading disabled individual to bear.

In a society in which great emphasis and value is placed on one's academic and employment success, where, in fact, one's worth is to a great extent assessed by one's scholastic prowess and occupational status, it would not be surprising to see higher levels of anxiety and depression among the overall reading disabled group. Although the analysis did not reach statistical significance, when the overall reading disabled group was compared to the non-impaired group, there was an observed trend in this measure, with the reading disabled group exhibiting higher rates of anxiety and depression compared to their non-impaired counterparts. In the subgroup analysis, the comparison between the low achieving and the average groups did reach statistical significance. Although we had also expected to find increased rates of anxiety and depression among all of the reading disabled individuals, the subgroup comparisons among the high IQ discrepant group did not reveal significant increased anxiety or depression. This might simply reflect a statistical limitation due to the small size of the group, or it may be that this group has learned to cope or compensate for their disability. Another possibility could be that these individuals have not yet been challenged enough, as they are only now

pursuing studies in higher education or just embarking in entry level jobs. It would be interesting to reexamine these individuals in a few years, as they confront more challenging tasks either in the work force or in academic pursuits.

The domain of social adjustment also revealed a trend, with the overall reading disabled group less likely to engage with the community. The low achieving group revealed significantly less social interaction compared to the average group. Once again, this may be related to the increased rates of anxiety, depression and embarrassment these individuals have experienced in school, and their wish not to subject themselves to social ridicule. Ordering from a menu or consulting a movie schedule can be both anxiety provoking and embarrassing for these individuals. This does not necessarily imply that these individuals are naturally anti- or asocial, or that they have poor opinions of themselves overall. In fact, in the realm of general self-concept, the overall reading disabled participants rated themselves higher than the non-impaired individuals. This may reflect a compensatory response, as these individuals feel that they must rely more on their other qualities and thus they place more emphasis on developing their skills in other areas to compensate for the deficit in the academic domain. The Tremaine Foundation survey (Tremaine, 2000) found that many parents regard their learning disabled children as having greater skills than non-impaired children in other areas, such as leadership, music, art and sports. This already reflects an early form of capitalizing on their strengths and accepting their weaknesses.

Another mode of compensation might be reflected in the increased rates of becoming parents and of pregnancy in the overall reading disabled population, both among the men and women. As many of these young adults are faced with continuous

struggles and failures in the academic and employment realm, having a child may represent an area of fulfillment, accomplishment, and success. During this time of fluctuations, a child could very well be a constant element that keeps these individuals grounded and satisfied. This may represent a more unconventional niche. While a few studies had made this observation about overall reading disabled women (Beitchman & Young, 1997; Maughan, 1995; Rauch-Elnekave, 1994), no studies have investigated the men. In our study, not only were the rates of parenting increased among the overall reading disabled men, but the rates of marriage as well. Creating a family unit may be ideally perceived as a source of accomplishment.

Our analysis of personal responsibility and behavior revealed another area of struggle. The incidence of delinquent behavior, regardless of whether the individual was apprehended or evaded the police, was increased among the reading disabled population, especially among the low achieving reading disabled subgroup. One can only speculate on the link between reading disability and delinquent behavior. It should be emphasized that only a small portion of the reading disabled population as a whole engages in criminal behavior, but in any given prison population there is a significantly high occurrence of reading disabilities. Many theories have been proposed to explain this observation and establish causality, but an answer has not yet been established. Repeated academic failure, embarrassment, frustration have all been implicated in the development of delinquent behavior (Smart et al., 1996; Waldie & Spreen, 1993). Other theories have evoked the co-occurrence of behavioral problems, such as impulse control to explain this finding (Fergusson & Lynskey, 1997).

On the other hand, nicotine and alcohol use revealed a trend, with less tobacco and alcohol use among the overall reading disabled population compared to the non-impaired group. If we had suspected that a difference existed at all, we would have expected the difference to occur in the opposite direction, with increased use among the reading disabled population as a form of self-medication. However, the overall reading disabled group appears to be less likely to use nicotine and alcohol. Adolescence and young adulthood are times of experimentation and the rates of use are rather high at this age and not particularly stable over time.

Risk and Resilience

While reading disability, in and of itself, is a risk factor for poor outcomes, we also sought to investigate whether any environmental stressors may contribute to the observed outcomes. The environmental risk factors were chosen to reflect environments that were unstable, stressful, filled with poverty, and could lead to adverse developments. We chose to compare individuals with the highest environmental risk score to all others. While more of the overall reading disabled individuals were classified as high risk this does not suggest that causality exists between these factors and the development of a reading disability, which has been a common misperception in the past. The only outcome that was significantly related to environmental stress factors was social adjustment, with less engagement with the community among the high risk group. The lack of stability appears to have created rather guarded individuals, who limit their interaction with other people, presumably fearing and avoiding further disappointments or difficulties.

These results once again emphasize that the reading disability by itself is a major risk factor in poor outcome. This does not, however, imply that everyone with a reading disability is doomed to failure. Although most will struggle, many do succeed in these measures of adulthood. Resilience exists among these individuals. The enticing question, though, is what factors contribute to resiliency? Why do some individuals ultimately succeed, while others do not? Although we had expected to see mentoring as a positive factor in outcome, the presence of mentoring did not predict positive outcome. The questions we posed, however, were rather broad, and may not have really addressed the type of mentoring to which these individuals might have been exposed to affect their outcome. We also examined a number of other factors that have been implicated in improving outcome. Being able to easily adapt to a new situation, being organized, lacking major behavioral problems, having an easy temperament, and being able to make friends easily should be helpful in compensating and coping with a learning disability. The lack of these factors should further complicate an already difficult time for the reading disabled population. Our analysis did show significant differences in these factors between the overall reading disabled and the non-impaired populations, with the overall reading disabled population exhibiting significantly more problems adjusting/adapting to new situations, far poorer organizational skills, and fewer friends. Behavioral problems revealed a trend of increased problems among the overall reading disabled individuals. These difficulties may very well contribute to their difficulties, as these factors lead to more negative responses from both parents and teachers.

When we examined these factors just among the overall reading disabled individuals, in an attempt to predict outcome, no significant differences were found. One

would expect that within the reading disabled population, those individuals who scored better on these measures would have better outcomes in the domains of education, anxiety/depression and delinquency. We were however limited in our sample size, especially when one considers that education and delinquency had a very skewed distribution, thus making it even more difficult to find significant differences. Many other factors might also be involved, which we did not address, such as self-motivation and persistence. Also, differences might be more apparent when this time of fluctuation and niche-picking has ended, and the individuals are more established.

Conclusions

The overall adjustment to adult life, with all of its concomitant liabilities, has proven to be a formidable task for the individuals burdened with a reading disability. While this period is laden with insecurity, change and instability for any individual, the reading disabled population is particularly vulnerable during this transitional time. Although most individuals are still exploring their options in all of the domains until they encounter an acceptable niche, many of the reading impaired individuals are experiencing a more difficult search, are giving up sooner, and/or resigning themselves to a less desirable position. The difficulties even transcend the educational domain to include psychosocial health and behavior. It should be emphasized that reading disability is a major health issue, with prevalence similar to diabetes mellitus. However, learning disability is not receiving the attention it should considering the high incidence and the many consequences. Dyslexia is a common, chronic learning disorder with potentially broad implications for any individual throughout his/her life. The reading disability itself

is placing these individuals at risk for a multitude of problems, both during the school-age years and into adulthood. Many individuals remain undiagnosed, continuing to struggle without any intervention to remedy the difficulties. Less than half of our research-identified reading-disabled individuals had ever been told that they have a learning disability. Only a fraction of those who were never identified actually suspect that they may have a disability. There is considerable debate over the exact definition and public policy surrounding reading disabilities, which may be contributing to the low rate of diagnosis. However, regardless of the reason, in the interim, many individuals are not receiving the appropriate interventions to help prevent some of the adverse consequences.

The deficits in management do not only exist in the academic realm, however. Many misperceptions about learning disabilities still exist. The public perception of learning disorders is such that the label of a reading disability can be quite stigmatizing. Many people actually believe that a reading disability is a form of mental retardation or simply an excuse for laziness (Tremaine, 2000). Expectations of parents and teachers for these individuals is often far below those of non-impaired readers (Meltzer et al., 1998). Many reading-disabled adults are embarrassed about their disability and seek to hide it from others, trying to deal with the problem on their own. A number of these adults, even very high-achieving reading disabled adults, live in constant fear of exposure, believing that they will be "found out" and branded as "impostors". A fifth of the reading disabled individuals who had been diagnosed expressed a fear of others finding out about their disability. They view their achievements as a stroke of good fortune, not a personal merited accomplishment, which may be revoked at any time.

The struggles and difficulties associated with a reading disability persist regardless of Full Scale IQ. The high IQ non-discrepancy individuals are not aspiring to their full potential, presumably due to years of internalizing their disability. They, too, need intervention to insure that they do realize their potential. Despite a higher IQ, the low achieving/discrepancy reading disabled individuals are struggling as much as the low achieving group, if not even more. Especially in the realms of education and delinquency, these young adults are facing serious challenges. All of these individuals should receive academic assistance to allow each of them to capitalize their educational potential and even possibly prevent some of these adverse outcomes.

At the same time, while many of the reading disabled individuals are struggling, a number of these individuals are nonetheless developing into successful young adults. Despite the many risks associated with a reading disability, they are making a successful transition into the adult world. The resilience exhibited by these individuals is remarkable. Identifying what factors allow these individuals to progress in this manner could be paramount to helping some of their less successful peers. Early intervention could certainly help prevent these adverse outcomes in vulnerable reading disabled children.

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Appendix A

Questions used in the preliminary outcome measures

Education	What is the highest grade in high school that you have completed What kind of high school diploma did you receive Have you begun or completed a technical, business, or trade school program leading to a professional certificate or license Since receiving your high school diploma have you continued your education
Anxiety/ Depression	Have you taken any medications prescribed by a doctor for depression During the last six months, how often did you: -feel worried or anxious -feel nervous -feel sad or down in the dumps -feel bothered by feelings of depression or hopelessness
Delinquency	Since you were 15 , have you ever been convicted of: -drunk driving -liquor law violations -disorderly conduct -drug use, possession or sales -serious damage to property, including arson -any kind of theft, including shoplifting, burglary or larceny have you ever been arrested for, or been in contact with the police or courts for anything else? How often have you done the same kinds of things but not been caught or convicted since you were 15 -drunk driving -selling drugs -serious damage to property, including arson -any kind of theft, including shoplifting, burglary or larceny -how many times have you gotten in a serious physical fight, either alone or part of a group, and where someone was stabbed or shot -how often have you pulled a gun or a knife on someone not for self defense -how often have you done anything sexually with someone against their will -how often have you hit a girlfriend or boyfriend, or someone else you were close to, other than self defense Have you served time in a jail, detention center, or some other kind of correctional facility How much time total, from age 15 on Are you currently on parole
Community involvement	How often have you attended or participated in religious activities or events How often have you participated in sports or exercise What about participating in school-affiliated clubs or organizations Fine arts, such as dance, drama, art, music? Creative writing? Just hanging out at home, like watching TV, talking on the phone, etc. Just hanging out outside the house, like going shopping or to the movies, but NOT including time you spend out on dates How often have you dated How often have you participated in volunteer work that was not court-ordered or required by a club How would you rate your overall satisfaction with your social life?

Nicotine/ alcohol use	Have you ever smoked cigarettes -how often What about using chewing tobacco or snuff -how often On average over the last year, about how often have you drunk any kind of alcohol, like beer, wine, liquor, or wine coolers?
Global self-concept	During the last six months, how often did you feel proud or good about yourself I feel good about myself I feel I am a person of worth, the equal of other people I am able to do things as well as most other people My plans hardly ever work out, so planning only makes me unhappy On the whole, I am satisfied with myself I feel useless at times At times I am no good at all I feel I do not have much to be proud of
Academic self- concept	I must work harder than most to be successful In order to be successful, I have to do things differently from most other people To do as well as most of my classmates, I have to work harder and longer I experienced a lot of embarrassment and frustration during elementary school I experienced a lot of embarrassment and frustration during high school I think differently than most people I work very hard to succeed People think I am very smart and competent I think I am very smart and competent

List of questions used in the revised outcome measures

Education	What is the highest grade in high school that you have completed What kind of high school diploma did you receive Have you begun or completed a technical, business, or trade school program leading to a professional certificate or license Since receiving your high school diploma have you continued your education
Anxiety/ Depression	Have you taken any medications prescribed by a doctor for depression During the last six months, how often did you: -feel worried or anxious -feel nervous -feel sad or down in the dumps -feel bothered by feelings of depression or hopelessness
Delinquency	Since you were 15 , have you ever been convicted of: -drunk driving -liquor law violations -disorderly conduct -drug use, possession or sales -serious damage to property, including arson -any kind of theft, including shoplifting, burglary or larceny have you ever been arrested for, or been in contact with the police or courts for anything else? How often have you done the same kinds of things but not been caught or convicted since you were 15 -drunk driving -selling drugs -serious damage to property, including arson -any kind of theft, including shoplifting, burglary or larceny -how many times have you gotten in a serious physical fight, either alone or part of a group, and where someone was stabbed or shot -how often have you pulled a gun or a knife on someone not for self defense -how often have you done anything sexually with someone against their will -how often have you hit a girlfriend or boyfriend, or someone else you were close to, other than self defense Have you served time in a jail, detention center, or some other kind of correctional facility How much time total, from age 15 on Are you currently on parole
Community involvement	How often have you attended or participated in religious activities or events How often have you participated in sports or exercise What about participating in school-affiliated clubs or organizations Fine arts, such as dance, drama, art, music? How often have you participated in volunteer work that was not court-ordered or required by a club How would you rate your overall satisfaction with your social life?
Nicotine/ alcohol use	Have you ever smoked cigarettes -how often On average over the last year, about how often have you drunk any kind of alcohol, like beer, wine, liquor, or wine coolers?

Global self-concept	During the last six months, how often did you feel proud or good about yourself I feel good about myself I feel I am a person of worth, the equal of other people I am able to do things as well as most other people My plans hardly ever work out, so planning only makes me unhappy On the whole, I am satisfied with myself I feel useless at times At times I am no good at all I feel I do not have much to be proud of
Academic self-concept	I must work harder than most to be successful In order to be successful, I have to do things differently from most other people To do as well as most of my classmates, I have to work harder and longer I experienced a lot of embarrassment and frustration during elementary school I experienced a lot of embarrassment and frustration during high school

Appendix B

Questions used in secondary outcome measures

Internal Locus of Control	I don't have enough control over the direction my life is taking Every time I try to get ahead, somebody or something stops me My plans hardly ever work out, so planning only makes me unhappy When I make plans, I am certain I can make them work
External Locus of Control	In my life, good luck is more important than hard work for success Chance and luck are very important for what happens in my life
Importance of Control	Being in control is important to me I am most confident when I am in control
Post-secondary school	Education after high school: -none -technical, vocational or trade school -2-yr jr/community college: technical vocational or trade program -2-yr jr/community academic program -4-yr college/university
Academic Aspirations	-current level -occupational, trade, technical or business school leading to professional degree or license -less than two years of college -two or more years of college (including associate's degree) -Bachelor's degree (four or five-year degree) -Master's degree or equivalent -any post-masters degree
LD status	Have you ever been told you have a learning disability If yes: Are you afraid others may find out about your learning disability If no: Do you think you may have a learning disability
Family	Current marital status Do you have any children Are you pregnant now/is anyone pregnant w/ your child
Mentoring	Other than your parents, is there at least one other adult you could talk to if you were having problems in your life Have you ever had a mentor, some older adult in your life who you really admired, who has believed in you, provided you with assistance and support, and had a big impact on your life and/or plans for the future

Employment status	Since receiving your high school diploma or certificate, have you continued your education? Type of post-secondary school: 1)technical/vocational trade school 2)2-yr jr/community college: technical/vocational/trade program 3)2-yr jr/community college: academic program 4)4-year college or university Dates when enrolled and left Do you consider yourself to be primarily 1) a student who may or may not also work full-time or part-time 2) a part-time or full-time worker who may or may not also take some classes, or neither? <i>If neither</i> is that because you are : 1)looking for work 2)keeping house full time 3)disabled 4)other In your current or most recent job: are you still working there? When did you leave?
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Appendix C

Questions used to determine risk factors

Maternal education	Highest grade level attained by mother
Parental marital status	Marital status of this child's parents
Parental medical history	Mother or father: -mental retardation -nervous breakdown or hospitalization for emotional problems
Parental behavioral history	Mother or father: -enjoyed drinking nightly -had a drinking problem -trouble with the authorities
Life events	-mother died/ father died -death of other family member who was close to child -death of close friend -mother/father seriously ill -serious illness of other family member close to child -serious illness of close friend of child -prolonged absence (>3months) of mother or father from home for any reason -prolonged absence of other family member who was close to child -close friend of child moved away -marital separation of parents -divorce of parents -parent fired or loses job -loss of home-fire, flood

Appendix D

Questions used to determine Protective Factors

Adaptability- Teacher	Gets upset by and can't tolerate changes in routine/schedule Problems during transitions: waiting, changing classes Takes challenges eagerly, adapts to new tasks Takes a long time to settle down to a new activity
Adaptability Parent	Does not adjust to new situations Does not adapt to changes in routine
Organizational Skills	How organized is this child's approach to tasks Dress appears disorderly, shoes, buttons undone
Behavior	At any age were the following behaviors true for this child: -does not obey the rules -violent temper -violent or aggressive, assaulted others, got into fights This child: -never disobeys the rules -Only disobeys or breaks rules if he thinks no one is around -May even disobey or break rules when supervised -Even disobeys or breaks rules while closely supervised Does things without thinking, impulsive Has behavior problems at home Has behavior problems outside the home
Acceptance/Likeability	Indicate whether the following are true -wants friends but is rejected or avoided by other children -has trouble adjusting to other children -How many friends does this child have
Temperament	Difficult to take on car rides Difficult to take on a visit to friends Difficult to leave with babysitter Difficult to take shopping During the ages up to 2 years how often did this child have -difficulty falling asleep -temper tantrums During the first months was this child diagnosed with colic



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